STIC Search Report
EIC 3700

STIC Database Tracking Number: 99402

TO:	From:
Jonathan M Foreman **Location: cp2 4b24** **Art Unit: 3736** **Tuesday, July 22, 2003** **Case Serial Number:**	**Terry Solomon** **Location: EIC 3700** **CP2-2C08** **Phone: 305-5932** **Terrance.solomon@uspto.gov**

Search Notes

Machine Translation of JP 6-063051.

WEST

End of Result Set

Generate Collection Print

L1: Entry 1 of 1 File: JPAB Mar 8, 1994

PUB-NO: JP406063051A
DOCUMENT-IDENTIFIER: JP 06063051 A
TITLE: CAPSULE DEVICE FOR MEDICAL TREATMENT

PUBN-DATE: March 8, 1994

INVENTOR-INFORMATION:
NAME COUNTRY
MIZUNO, HITOSHI
KUDO, MASAHIRO

ASSIGNEE-INFORMATION:
NAME COUNTRY
OLYMPUS OPTICAL CO LTD

APPL-NO: JP04221573
APPL-DATE: August 20, 1992

US-CL-CURRENT: 604/232
INT-CL (IPC): A61B 10/00

ABSTRACT:

PURPOSE: To exactly, accurately and stably measure the chemical quantity of the internal fluid in the desired position in a body by providing the part near the exposed part of the sensor of a capsule body with a fixing part for fixing yarn to hold the capsule body in a home position within the living body.

CONSTITUTION: An annular yarn mounting groove 13 for mounting the yarn 12 for fixing the position of the capsule body 2 in the celom to the capsule body 2 is provided in the position near the exposed part of the sensor on the outer peripheral surface of the capsule body 2. One end of the yarn 12 is wound and fixed to the yarn mounting groove 13 of the capsule body 2 and the other end is fixed to the circumference, etc., of the patient's tooth or mouth. The capsule body 2 is then swallowed by the patient, is orally taken into the stomach and is allowed to indwell therein. The capsule body is so constituted that the point of measurement is known from the length of the yarn 12 at this time. The posture of the capsule body 2 is held in the state that the direction of the sensor faces the direction of the yarn, by which the internal fluid flowing from the upstream side in the living body is surely brought into contact with the sensor.

DIALOG(R)File 345:Inpadoc/Fam.& Legal Stat

11669634
Basic Patent (No,Kind,Date): JP 6063051 A2 940308 <No. of Patents: 001>

PATENT FAMILY:
JAPAN (JP)
Patent (No,Kind,Date): JP 6063051 A2 940308
CAPSULE DEVICE FOR MEDICAL TREATMENT (English)
Patent Assignee: OLYMPUS OPTICAL CO
Author (Inventor): MIZUNO HITOSHI; KUDO MASAHIRO
Priority (No,Kind,Date): JP 92221573 A 920820
Applic (No,Kind,Date): JP 92221573 A 920820
IPC: * A61B-010/00
JAPIO Reference No: ; 180301C000074
Language of Document: Japanese

Patent/ public disclosure document
1994063051

[Abstract(made by the applicant)] [Claims] [Detail Description] [Drawing Description]

(57)
[ABSTRACT]

[PURPOSE]
It is most primary characteristic of the present invention that accuracy well does instrumentation of stoichiometry of internal fluid of internal object lay in stability in right.
[CONSTITUTION]
Cat's cradle bezel 13 of anchoring thread 12 holding capsule body 2 in normal position *oki* in living matter dated is established in an around outcrop part of pH sensor 4 in main body of capsule 2.

[WHAT IS CLAIMED IS:]

[Claim 1]
In the medical capsule apparatus that sensor measuring stoichiometry of invivo internal fluid is loaded in exposure condition by the main body of capsule for; Capsule apparatus for medical treatment; comprising: A fixed member of anchoring thread holding above capsule body in normal position *oki* in living matter in around outcrop site of said sensor in the main body of said capsule.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[INDUSTRIAL APPLICATION FIELD]
The present invention relates to capsule apparatus for medical treatment measuring stoichiometry of a secreting fluid in alimentary canal such as ventriculus, bowel.
[0002]

[PRIOR ART]
In general, Conventionally, that stoichiometry such as pH value, ionic concentration of digestive liquor in alimentary canal is measured is done to do analysis of diagnosis and physiology of digestive system disease. Of these, autoscope and a catheter are interposed in the body of case, there is the formula which formula autoscope channel and a catheter are gone through, and a secreting fluid of gastric juice is gathered, and to analyze and pH sensor catheter belonging to is interposed in body of case, and measure, but, pain to give case in these formula is massive, and continuous measurement is distress.
[0003]
In there, That determination information in alimentary canal is measured serially by radio from outside the body is done by making it makes case swallow the capsule which aggression to case is reduced, and, by way of example only, it seems to be shown in feather *ko** 43-25272 bulletin as measure realizing determination for a long time, and sensor and transmitter were incorporated in, and interpose in body.
[0004]
In addition, One end of thread is fixed to perimeter of tooth of case or orifice at true *ko** 49-10149 bulletin, the thing which did is disclosed in assembling fixing lay of medical capsule in the body of case by what is fixed to medical capsule interposed another end of this thread in in body of case.
[0005]

[PROBLEM TO BE SOLVED BY THE INVENTION]
Most of medical capsule making it makes a patient swallow like true *ko** 43-25272 bulletin, and interpose in body do not have a fastening means of capsule in body according to status. Therefore,

Because capsule always moves by means of *zen do* motion of alimentary canal in instrumentation of a secreting fluid in alimentary canal, there is the issue which cannot determine determination locality of alimentary canal corresponding to data of measured stoichiometry in right.
[0006]
In addition, Of sensor loaded fixed location of the anchoring thread which is fixed to capsule body in medical capsule like true *ko** 49-10149 bulletin by thread when it was done in assembling fixing lay in body by capsule body, because when it is installed, and lay is left, sensor department of capsule body is hard to turn in upstream of alimentary canal in body, it cannot make sensor touch enough digestive liquor drifting from upstream, there is the accuracy issue that it is well difficult to do in instrumentation of digestive liquor.
[0007]

[OBJECT OF THE INVENTION]
With the thing which the present invention pays its attention to the circumstances, and was done, the object is to provide the accuracy medical capsule apparatus which stability can well do for in right in instrumentation of stoichiometry of internal fluid of object lay in body.
[0008]

[MEANS TO SOLVE THE PROBLEM]
As for the present invention, sensor measuring stoichiometry of invivo internal fluid establishes a fixed member of anchoring thread holding the capsule body in normal position *oki* in living matter in around outcrop site of the sensor in the capsule body in medical capsule apparatus loaded in exposure condition by the main body of capsule for.
[0009]

[OPERATION]
It makes hold position of capsule body interposed in body by establishing a fixed member of fixed thread of the main body of capsule in around outcrop site of sensor in capsule body in the condition that a direction of instrumentation sensor faces direction of thread, it made the internal fluid which drifted from upstream in living matter touch sensor surely.
[0010]

[EXAMPLE]
As follows, One embodiment of the invention is explained referring to figure 1 - figure 5. FIG. 1 shows main body of capsule 2 of capsule apparatus 1 for medical treatment. Central pipe body 3, pH sensor 4, telemeter circuit board 5, battery receiving area 6 are installed in main body of this capsule 2 respectively.
[0011]
In here, Watertight seems to be kept in condition fitted by one end side opening of central pipe body 3 of main body of capsule 2, and pH sensor 4 is bonded. This pH sensor 4 comprises *ha* pH sensitive electrode 7 and reference electrode 8. It is fixed encapsulation to these pH sensitive electrode 7 and reference electrode 8 within main body of sensor 9 comprising of synthetic resinous materials of epoxy.
[0012]
Even more particularly, Coke strength, noise resistance are sexual as against glass electrode, the antimony electrode which have been used conventionally together, and electrode 7,8 are the needle-shaped electrode that it is than the metallic oxide film which assumed superior iridium base in face of determination accuracy. In addition, Manager 10a of inside a pair of K Cl (potassium chloride) solution of main body of sensor 9, 10b are formed. And, Head of reference electrode 8 is interposed in one K Cl solution manager 10a.
[0013]
Baculiform liquid junction department 11 formed by ceramic material, for example, is arranged on in

other K Cl solution manager 10b. As for one end of this liquid junction region 11, condition, another end protruded a little by outside side are loaded in condition interposed in K Cl solution manager 10a by a distal surface of main body of sensor 9. This liquid junction region 11 and contact portion with main body of sensor 9 are sealed in the shape of aqua *mitsu*, it does not seem to leak, and K Cl solution manager 10a, interior K Cl solution of 10b are held by external side.

[0014]

In addition, A ring-shaped cat's cradle to install touches thread 12 to fix lay of capsule body 2 in body cavity to around outcrop lay of main body of sensor 9 as shown in FIG. 2 to capsule body 2, and bezel (a fixed member) 13 is installed in outer circumferential surface of main body of capsule 2. Even more particularly, One end of pH sensitive electrode 7 is installed in condition protruded a little by outside side by a distal surface of main body of sensor 9.

[0015]

In addition, Telemeter circuit board 5 is arranged in a pipe of central pipe body 3. For this case, *(Fail: - 1003:::: This sentence faied in the transration.)* Spacer 14 becoming than insulative material is kai*sa between these two pieces of circuit board 5a, 5b. In addition, Two pieces of circuit board 5a, a 5b interval are connected for electrical services through the lead wire which is not illustrated.

[0016]

Even more particularly, Spacer 15 which becomes pH sensor 4 than insulative material between telemeter circuit board 5 equally is kai*sa. In addition, Signal line 16,17 connected to electrode 7,8 go along 15 spacer internal from a proximal end surface of main body of sensor 9, is extended by five telemeter circuit board side. And, An extending end of these signal lines 16,17 is connected to the first circuit board 5a of telemeter circuit board 5. Line-shaped aerial wire 18 to transmit instrumentation information converted into sign in the second circuit board 5b of this telemeter circuit board 5 in outside the body is implemented.

[0017]

In addition, Battery receiving area 6 is disposed in a contralateral end with an insertion end of pH sensor 4 in central pipe body 3 of main body of capsule 2. Battery box 19 which is cylindrical abbreviation to this battery receiving area 6 and battery exchange comprises generally cover 20 to attach and detach to and of bottomed cylindrical.

[0018]

For this case, External screw department 19b is installed in fixed end department 19a fitted in condition interposed in the one end side in open end of central pipe body 3 to battery box 19, other end side outer circumferential surface respectively. And, After it was crossed, and pH sensor 4 and division of telemeter circuit board 5 were attached to central pipe body 3, fixed end department 19a of battery box 19 is interposed in open end of center pipe body 3, is bonded in the condition which - *kyokusetsu* single 24a to be described below is caught, and is fitted and become integrated with with center pipe body 3.

[0019]

Even more particularly, It is accommodated in the condition that two battery 21a, 21b are serially-connected inside of battery box 19, and power source line 25,26 of - *kyokusetsu* single 24a to connect between these battery 21a, 21b and telemeter circuit board 5, + *kyokusetsu* single 24b and couple are installed respectively.

[0020]

In addition, After the soldering activity which connected telemeter circuit board 5 to - *kyokusetsu* piece 24a for battery for electrical services by power source line 25 interposed telemeter circuit board 5 and pH sensor 4 from right open end of FIG. 1 of center pipe body 3 of capsule body 2 (a), before bonding battery box 19, it becomes do.

[0021]

For this case, Sinistral battery 21b is disposed of FIG. 1 (a) by the lay which did eccentricity as against center of main body of capsule 2, the access which puts + *kyokusetsu* single 24b in internal of battery box 19 as shown in FIG. 1 (b) is formed by this. And, As for the - pole of right battery 21a, the contour which is + pole of sinistral battery 21b is connected to + *kyokusetsu* single 24b for each electrical

services in - *kyokusetsu* piece 24a of FIG. 1 (a) , even more particularly, these go through power source line 25,26, and is connected for telemeter circuit board 5 and electrical services.

[0022]

In addition, Female screw department 20a to engage threadedly to external screw department 19b of battery box 19 to a pipe part internal perimeter surface of cover 20 is formed. Even more particularly, Basilar part in a *thing* of this cover 20 comprises elastic member 23 to keep ha cover 20 and battery 21a, watertight between *things* of 21b. And, Cover 20 is attached threadedly to battery box 19 in the condition that two battery 21a, 21b are accommodated inside of battery box 19 releasably, of this cover 20, watertightness of capsule body 2 becomes keep by making it is screwed, and elastic member 23 adhere to 19 battery box side with action.

[0023]

Even more particularly, Small seat 27 of friction drag of Teflon is interposed between cover 20 and elastic member 23, when cover 20 is installed to battery box 19, when cover 20 is screwed, and it works, shear force to elastic member 23 to produce is relaxed.

[0024]

In addition, As for FIG. 3, as for figure of block, FIG. 4 of telemeter circuit of telemeter circuit board 5 (a), each shows circuitry of the second circuit board 5b in circuitry of the first circuit board 5a of telemeter circuit board 5, the figure above (b). For this case, Power circuit 30 connected to tension control transmitter (V C O) 28, dispatch circuit 29, battery 21a, 21b connected to pH sensor 4 as shown in FIG. 3 is installed in telemeter circuit respectively.

[0025]

Even more particularly, V C O 28 is installed in the first circuit board 5a of telemeter circuit board 5 as shown in FIG. 4 (a), dispatch circuit 29, power circuit 30 are installed in the second circuit board 5b as shown in FIG. 4 (b) respectively. And, PH sensor 4 is connected to V C O 28 of the first circuit board 5a, and battery 21a, 21b are connected to line-shaped aerial wire 18, power circuit 30 to dispatch circuit 29 of the second circuit board 5b respectively.

[0026]

In here, V C O 28 is RC dispatch circuit becoming than commercial OS inverter, drag, capacitor, and dispatch circuit 29 is *korupittsu* dispatch circuit. In addition, Power circuit 30 consists of a commercial OS regulator, bypassing capacitor.

[0027]

And, By way of example only, as for the sign output from pH sensor 4 in determination of alimentary canal interior pH value such as ventriculus / bowel, is input to V C O 28 , even more particularly, as for the horsepower from this V C O 28, become input to dispatch circuit 29. In addition, Electric power becomes supply from power supply circuit 30 connected to battery 21a, 21b by V C O 28, 29 dispatch circuit each.

[0028]

Next, The constructive action is explained. At first, It makes it makes case swallow capsule body 2 as shown in FIG. 2 in application of capsule apparatus 1 for medical treatment beforehand, and it is taken in ventriculus I per os, and crowd, it makes detain.

[0029]

In here, Other end of capsule lay anchoring thread 12 which a one end winds around cat's cradle charge account bezel 13 of main body of capsule 2, and is fixed is fixed to tooth of case, circumference of orifice, dislodging of capsule body 2 is prevented, and a determination point becomes understand by length of thread 12. By way of example only, Capsule body 2 seems to be located in the vicinity of a few pyloruses, and *zen do* motion of comparison to be able to put in ventriculus I in the condition that thread 12 was set up as shown in FIG. 2 moderately regulates length of thread 12.

[0030]

In addition, By way of example only, it is touched with a secreting fluid in alimentary canal pH sensitive electrode 7 and liquid junction department 11 protruded in the surface of pH sensor 4 in determination of alimentary canal interior pH value such as ventriculus / bowel. Then, A secreting fluid in alimentary

canal goes through innumerable tininess hole formed within quality of ceramics of liquid junction region 11, pass, and is introduced K Cl solution manager 10b of on the other hand within interior K Cl solution of other K Cl solution manager 10a. And, Ion exchange is done in this K Cl solution, and tension corresponding to pH value of the secreting fluid appears between pH sensitive electrode 7 and reference electrode 8.

[0031]

This value goes through signal line 16,17, and is input to telemeter circuit board 5, modulation of the voltage value that had pH information, dispatch are done. In other words, At first output voltage of pH sensor 4 is input into V C O 28 with this telemeter circuit board 5. This V C O 28 is the thing that horsepower frequency varies with alteration of an input voltage value, and pH information provided by means of input tension here is output in condition converted to frequency.

[0032]

As for the character of this V C O 28, alteration amplitude of the frequency which connection with tension and frequency beats in linear being wide is called for as shown in FIG. 5. In addition, Theory value of evolution electromotive force of pH sensor 4 is 59mV /pH, and tension alteration amplitude to 1-14 of pH value is 59*13=767mV.

[0033]

By way of example only, If when frequency alteration amplitude of V C O circuit supposes with 10KHz, frequency corresponding to 0.1 pH is enough the value which can measure with about 77Hz, and it is the frequency alteration amplitude, when enough accuracy is provided, it is conceivable.

[0034]

In addition, Output signal from V C O 28 is input into dispatch circuit 29, frequency modulation does carrier wave of frequency 80MHz to occur of *korupittsu* circuit. Even more particularly, Carrier wave is transmitted than antenna 18 connected to collector of transistor of *korupittsu* circuit to outside the body. And, PH value in alimentary canal can be measured by receiving this carrier wave in outside the body.

[0035]

In addition, Battery 21a which power circuit 30 goes through power source line 25,26, and is supplied, tension from 21b are stabilized with a regulator, each is supplied to V C O 28 and dispatch circuit 29. In particular, As for V C O 28, horsepower frequency varies by floating of line source, line source is supplied through an individual regulator in each to V C O 28 and dispatch circuit 29 to produce error, soundness of tension is raised. In addition, As for V C O 28 and power circuit 30, consumption current is configured by means of a few commercial OS element to lengthen action duration of main body of capsule 2.

[0036]

In there, Because bezel 13 dated cat's cradle which fixed other end of lay anchoring thread 12 which one end was fixed to to perimeter of tooth of case or orifice was disposed in around outcrop lay of sensor body 9 in capsule body 2 in the constructive thing, direction of thread 12 always can that is to say hold a direction of pH sensor 4 in condition for upstream of alimentary canal in position of capsule body 2 in ventriculus I.

[0037]

Therefore, Because it can make in alimentary canal namely digestive liquor drifting from an upstream of ventriculus I touch outcrop of sensor body 9 in capsule body 2 in instrumentation of digestive liquor surely, instrumentation of the digestive liquor which is authenticity can work.

[0038]

In addition, Telemeter circuit board 5 is formed by means of two circuit board 5a, 5b, component of telemeter circuit is separated from in two circuit board 5a, 5b according to circuit, because each disposed dispatch circuit 29 and power circuit 30 in 28 times of V C O path, the second circuit board 5b in the first circuit board 5a, mutual interference of both electrical services is lost, degradation of accuracy determination can be prevented.

[0039]

In other words, Because 28 times of V C O path is division to convert information from pH sensor 4

into, high accuracy is called for, but, consumption current is controlled to realize action for a long time, dispatch circuit 29, effect of noise by power circuit 30 are easy to be received. In there, Degradation of accuracy determination is prevented by posting both in separate condition on basal plate 5.
[0040]
In addition, In accordance with exemplary embodiments, basal plate 5 is divided by means of current flowing value in telemeter circuit, but, if, by way of example only, telemeter circuit separates the analog to digital conversion circuit which is 29. dispatch circuit power circuit 30 which are analog department and digital department from on basal plate 5 when it is using P commercial formula, mutual interference of electrical services can be controlled.
[0041]
In addition, FIG. 6 shows a fastening means of capsule 31 for apoplexy detection / action which is capsule apparatus for medical treatment which is different from the embodiment. Microbattery 38 as blood sensor 32, by way of example only, to detect apoplexy in intestinum tenue H in body cavity, tele met re-department 33 to transmit information of this sensor 32 to outside the body, micropump 34 to pour chemical, ultrasonic transducer 35 to get echogram of circumference of capsule body 31a, micromotor 36 to turn this ultrasonic transducer 35, microencoder 37 to detect angle of rotation of this motor 36 and drive power source is had built-in in body 31a of this capsule 31 respectively.
[0042]
Even more particularly, Internal surface of micromanipulator 39 ... pouring position control drug of the plural number that it can curve with an actuator of, by way of example only, in outside surface of this capsule body 31a SMA (a shape-memory alloy), it is configured capsule body 31a intestinum tenue H comprises balloon 40 to fix.
[0043]
This capsule 31 fixes main body of capsule 31a ego to internal surface of intestinum tenue H by balloon 40 and 39 position controlling micromanipulator ..., when there were hemorrhagic presence and apoplexy with blood sensor 32, the site is detected, action to pour chemical of hemostatic into by 39 *maikuromanipyuta* ... is done.
[0044]
In addition, Peripheral fabric fault image can be got by built-in ultrasonic transducer 35 of main body of capsule 31a, too. Data from data and sensor 32 provided by this oscillator 35 is transmitted more by radio than tele met re-department 33 in outside the body.
[0045]
In there, When main body of capsule 31a can be fixed in anchoring thread in the constructive thing, of course anchoring by anchoring thread arrives at a deep part of the intestinum tenue H that it is difficult, it can be fixed. In addition, What deformation can carry out in the area which does not deviate from abstract of the present invention rather than a thing limited to the embodiment the present invention in various ways, of course.
[0046]

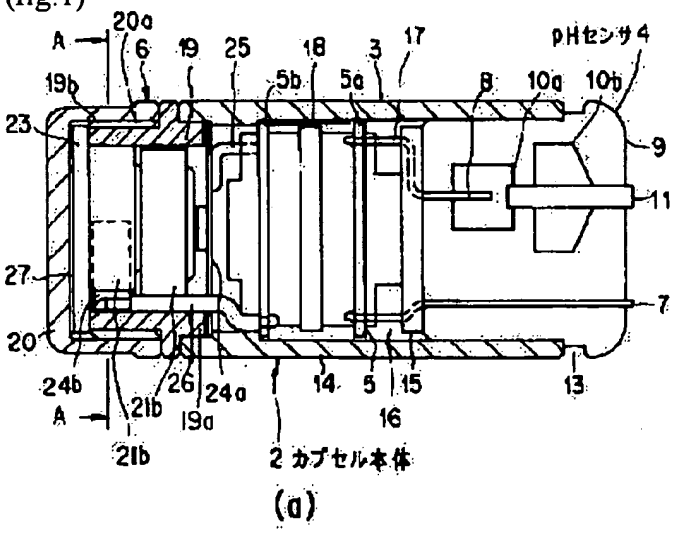
[EFFECT OF THE INVENTION]
According to the present invention, Because a fixed member of the anchoring thread which held capsule body in normal position *oki* in living matter was established in a neighborhood part of outcrop of sensor in the main body of capsule, accuracy is preferable, and stability can do instrumentation of stoichiometry of internal fluid of object lay in body in right.

[BRIEF DESCRIPTION OF DRAWINGS]

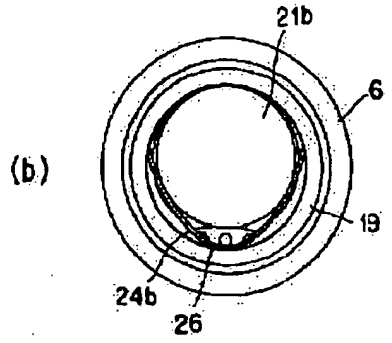
[FIG. 1]
Longitudinal profile showing the main body of capsule (b) (a) is A-A line cross section with a thing showing one embodiment of the invention (a).

[FIG. 2]
It is outline block diagram showing the condition which made the body of case interpose the main body of capsule.
[FIG. 3]
It is a figure of block of telemeter circuit.
[FIG. 4]
Outline block diagram to show circuitry of the first circuit board in (b) is outline block diagram to show circuitry of the second circuit board in with a thing showing circuitry in the main body of capsule (a).
[FIG. 5]
It is character figure to show connection with input tension and horsepower frequency of transmitter in.
[FIG. 6]
It is a perspective diagram showing a fastening means according to a *thing* of the main body of capsule.
[DENOTATION OF REFERENCE NUMERALS]
The main body of two ... capsule, four ... pH sensor, 12 ... lay anchoring thread, the 13 ... cat's cradles bezel dated (a fixed member).

(fig.1)

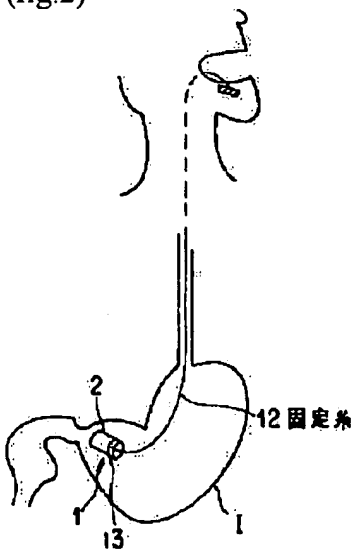


(a)

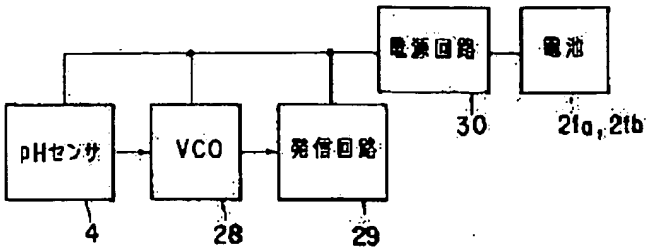


(b)

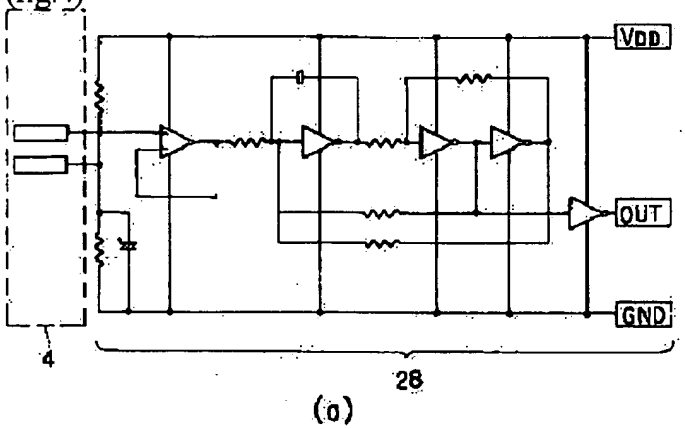
(fig.2)

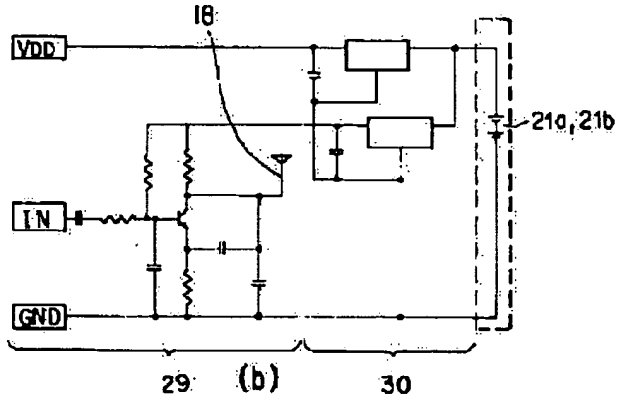


(fig.3)

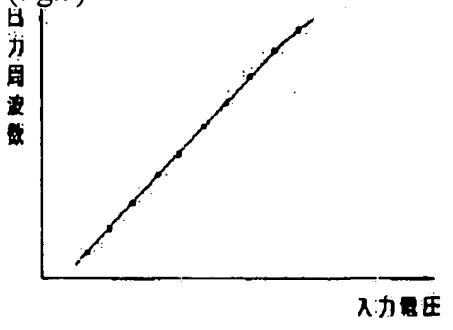


(fig.4)

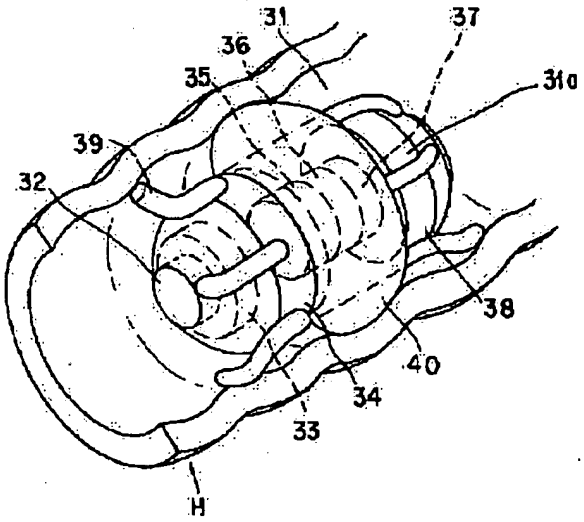




(fig.5)



(fig.6)


31
37
36
35
310
39
32
38
40
34
33
H